

Lighting in offices like that at left is now considered excessive and wasteful of energy. Newer concepts are at right, one decorative and one standard.



Let There Be Less Light, Experts Tell Office Workers

By CARTER B. HORSLEY

Offices are getting dimmer as the lighting industry introduces new advances in technology and experiments with new standards for measuring light.

Such changes are only just beginning to filter down to the consumer—the office worker—but experts expect them to become much more noticeable with the resumption of an active office construction market and with the adoption of new Federal and state energy conservation guidelines.

And the level of illumination is not all that is changing in the office environment. The so-called "open landscape" revolution, which about a decade ago began to do away with most private offices in large corporate and institutional space users, is continuing unabated.

Now being tested is the "work station," a more complex and self-contained replacement for the old-fashioned desk, one of whose features is built-in lighting.

The new governmental regulations, according to many experts, will cause landlords and tenants to reduce their lighting requirements significantly—by almost half in some instances.

They may also intensify a growing controversy between office tenants and landlords over electricity bills.

Many tenants contend that landlords are

"gouging" them by charging what amounts to retail prices for electricity purchased wholesale. For example, one landlord here, according to a lighting consultant, has been paid by one of his major office tenants about \$1 million more over a 10-year period for electricity than the sum the utility charged him to deliver it to the building.

Landlords counter that the various rate increases granted utilities in recent years have caused administrative nightmares and made bill-collecting without submetering far from profitable.

Certainly, lighting office buildings is big business. About 40 percent of Con Edison's power in New York City is expended on lighting. The typical office ceiling lighting fixture, which illuminates about 70 square feet of office space, contains four fluorescent lamps and costs almost \$50 a year to operate, according to Howard Brandston, a lighting specialist.

"It is distinctly possible that only two such lamps are necessary in the fixture," he says. This would represent a potential annual savings of 15¢ at 30 cents a square foot. There are about 250 million square feet of office space in Manhattan alone.

Furthermore, according to the calculation of Sheldon Steiner, a partner in the consulting engineering firm of Flack & Kurtz, for every 30 cents a

square foot of savings in lighting expenses for an office building, about 10 cents can be saved in its air-conditioning expenses. In the South, where air-conditioning is used during a greater part of the year than in the Northeast, such savings can be augmented by about 50 percent, Mr. Steiner said.

The existing rate structures for electricity in New York City and the method of payment for office tenants, Mr. Steiner said, tend to mitigate against energy conservation.

Most office leases provide for tenants to pay for their own electricity and absorb any escalation in those rates. The landlord, in most cases, acts as a bill collector for the utility. But in many cases, Mr. Steiner said, there is a considerable "mark-

Continued on Page 6, Col. 1

	INSIDE
Realty News	Page 6
Home Style: A Conversion From Lighthouse to House	Page 8

Let There Be Less Light, Experts Tell Office Workers

Continued from Page 1

up," perhaps as much as 50 percent. Some shopping center owners, Mr. Steiner said, maintain that their only profit is made on the sale of electricity.

On Edison's charges, Mr. Steiner said, are more expensive for the small user. Its demand charge, for example, for the first 100 kilowatts of usage is \$11.66. This rate declines as far as \$8.6 for greater usage. The same applies to the utility's energy charges for office buildings, which begin at \$4.91 per kilowatt hour for the first 40,000 kilowatts, but fall to \$4.16 for the next 1,460,000 kilowatts.

The landlord pays his utility bill for the electricity delivered to the building at the bulk rate, but each tenant's bill starts from the more expensive scratch.

"There is big money to be made in the sale of electricity," Mr. Steiner said, adding that often the taxes included in tenants' electrical bills total more than the city actually receives because the landlord only pays for the tax owed on the amount he uses at lower rates.

Taxes, actually, have become a significant incentive for some office tenants to install work stations with "task ambient lighting," or T. A. L., as it is known. These work stations have added their own built-in lighting to the ever-expanding combination of a desk with filing space, closets, wall partitions and pertinent office equipment such as typewriters, computer display terminals and telephones.

Work stations, designed to democratize the office and make its rearrangement, which frequently occurs, easier and cheaper, offer tenants a tax advantage because they can often be used as investment credits. Furthermore, the work stations have a "salvage" value.

The T. A. L. "furniture" gives the user adequate downward light to conduct his tasks and it also throws light upward to illuminate the room. Such indirect lighting is very desirable in offices with considerable usage of computer display terminals that are subject to glare problems. One T. A. L. manufacturer, Knoll International, stresses that the system frees a user from having to align his station partitions with existing patterns of ceiling fixtures.

T. A. L. systems are new and still controversial. Citibank has contracted to install a T. A. L. system in its new midtown skyscraper here but the manufacturer has not yet gotten it to conform to the city's permit codes.

Mr. Brandston says he is opposed to T. A. L. because it places the flickering fluorescent light too close to the user for comfort and because he does not think "a decent system has yet been designed."

And Thomas Imperatore, senior vice president and manager of project consulting of Cushman & Wakefield Inc., says that T. A. L. poses an air conditioning problem because of heat recovery. Much of the energy consumed in lighting is given off in heat (as much as 80 percent with incandescent lights) and nor-

mally much of this can be recovered from a ceiling fixture. The heat given off in the T. A. L. systems, however, is dispersed into the room.

Over the years, recommended lighting standards have been increasing and the industry has based its criteria on the most difficult tasks to be performed in given areas, even if the tasks were "shotgun" coverage rather than a "file" approach that pinpointed different tasks. There are essentially no minimum legal lighting requirements now for offices other than for some exit signs.

A long perspective on office lighting is offered by William M. C. Lam, a lighting consultant and author of the recently published book, "Lighting and Perception as Formivores for Architecture," Mr. Lam writes:

"Designers, faced with an extraordinary rapid turnover of products and a fast, fragmented process of design and construction which has taken root in this electronic age, have yielded the control which they once exercised over the luminous environment to others: to electrical engineers, who have been primarily trained to meet minimum footcandle requirements; to building owners, who come to them with misconceived programmatic objectives; and to misguided government officials, who have been brainwashed by propaganda from the lighting and power industry into adopting and enforcing irrelevant obstructive codes in the name of progress."

"After centuries of painstakingly and often ingeniously manipulating our buildings to suit the vagaries of natural light," Mr. Lam says, "we find, paradoxically, that we have very little aptitude for manipulating our new wealth of artificial light to suit the vagaries of our buildings."

Energy savings, of course, need not be limited to new construction. Mr. Steiner removed three standard ceiling light fixtures from his own office that consumed about 600 watts and replaced them with one hanging fixture of slightly different design that uses only 100 watts.

Occasional cleaning of lighting fixtures can sometimes improve efficiency as much as 30 percent, Mr. Steiner said, and a change in the color of a small office's walls, ceiling and floor from a deep color to white can result in a 40 percent increase in efficiency.

Too often, Mr. Steiner said, designers have recognized only a single lighting "task" in an office—reading a paper on a horizontal surface. "If one doubles the size of print on a page," he said, "it has the same effect as a 10-fold increase in illumination. An office exists for people, not just for desk surfaces. Lighting is very important because the ability to perform visual tasks in comfort, to adjust the environment to one's particular satisfaction to some extent and to modify as needs vary will all contribute to productivity."

A famous experiment several decades

ago at a Western Electric Company plant in Hawthorne, N. J., found that productivity increased not only when light levels were raised but also when they were lowered. It concluded that the increased productivity stemmed from the workers feeling better because someone was paying attention to their environment.

Some employers place very bright lights and highly reflective surfaces in their bathrooms, says Aaron Cohen, an architect, because they want to discourage lengthy visits that cut into employee productivity.

Productivity, of course, is only one lighting consideration. A variety of psychological and biophysical needs such as place orientation, sense of time and weather, definition of personal "territory" and esthetic entertainment are greatly affected by light. The effects of light on human health, however, are a matter of continuing controversy.

A study for the Canadian Government undertaken in 1978 by William Lam Associates concluded that "low levels of illumination have nothing to do with general health as long as they are adequate for safety" and that there was "little or no conclusive evidence which relates comfort to high levels of illumination."

Yet some studies indicate that people who spend most of their time indoors and are exposed to little ultraviolet light may develop Vitamin D deficiencies. And other studies have indicated correlations between light and sexual maturation and the production of saliva.

In recent years, some new methods of measuring light have evolved as the standard footcandle measurement did not reflect problems of glare, or color of light, or other environment factors. One such standard is known as the "Visual Comfort Probability Index," which measured glare and other "visual noise." Another new standard is the "Equivalence Sphere Illumination" footcandle, which relates the position of the lighting task to the observer and the source of light.

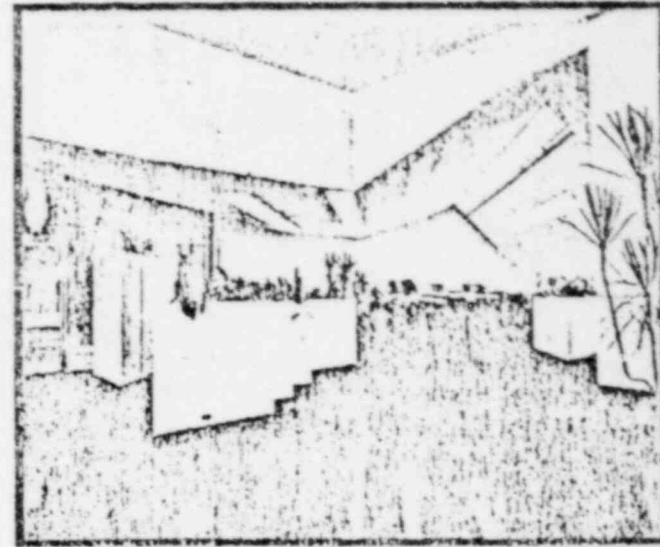
Most lighting consultants maintain, however, that even the new standards, which are not yet widely in use, are often inadequate for determining comfortable, pleasant, unambiguous and energy conserving light levels in the increasingly complex and flexible office environment.

Many consultants view lighting levels recommended by such industry organizations as the Illuminating Engineering Society as excessive. "One wonders how Beethoven ever wrote his music, or whether it is possible for Americans to work in European offices?" Mr. Brandston mused. British standards recommend about 9 footcandles for lighting of office building corridors, he said, whereas many American office building codes use about 150 footcandles in their corridors. "Most engineering firms," he continued, "still blanketly put light everywhere."

Many designers feel that interior lighting is an increasingly important area for research. With "controlled environmental jungles such as Las Vegas and some of the exciting environments that architects like John Portman with his large atriums has created," Mr. Cohen says, "no one wants to go outside."

"Today," Mr. Lam writes, "our most comfortable, pleasant spaces are those in which the designers and users retained control over the layout and fine-tuning of the light; spaces such as churches and museums, stores and restaurants, in which objects of interest are appropriately emphasized by the luminous environment and set against backgrounds free from visual noise."

"Designers must develop and accept a new vocabulary and grammar of form, phrased in visual and perceptual rather than numerical terms," he says. "Until those who own, design, finance, build, regulate and maintain our physical environments base their work on a deeper understanding of the principles of perception and of the total nature of human perceptual needs, they will continue to grind out bad luminous environments."



Sloped ceilings at Swiss Bank offices help create unusual lighting effects.

Realty News

Rockefeller Center

Seven companies have leased a total of 139,000 square feet of office space at Rockefeller Center, either as new tenants or in expansion of their existing facilities, at an aggregate rent of more than \$22 million.

The leases ranged from 9 to 17 years. Simon & Schuster has taken an additional 26,400 square feet for 17 years at 1230 Avenue of the Americas, where it is the major tenant, and it now occupies more than 131,000 square feet in the center.

The Federal Insurance Company has leased 21,000 square feet for 15 years in Celanese Building at 1214 Avenue of the Americas.

The law firm of Paskov, Gordon & Hyman has leased 21,000 square feet for 17 years at 45 Rockefeller Plaza.

Brands Mart, a member cardholders-only discount retailer, has leased 19,700 square feet on the concourse of the Time & Life Building for 10 years.

The Kayser Roth Corporation has taken 19,000 square feet on the concourse of the Celanese Building for an employee exchange for its personnel to purchase company-manufactured products. The company has its executive offices in the McGraw Hill Building at 1221 Avenue of the Americas.

Viacom International Inc., a cable television company and supplier of television shows, has taken an additional 18,000 square feet for 9 years in the Celanese Building, where it now has a total of almost 50,000 square feet.

The Equitable Life Holding Corporation of the United States has leased 13,900 square feet in the AMAX building at

1270 Avenue of the Americas for 10 years.

The center is now more than 97 percent occupied.

Frederic Green, vice president, of Barclay Realty Ltd., was the broker in the Federal Insurance lease, Gordon McCollum of Cushman & Wakefield Inc., was the broker in the law firm's transaction, Arlen Realty & Development Corporation was the broker in the Brands Mart lease, Thomas M. Emma and Richard Leff, senior vice presidents, of Collins Tuttle and Company were the brokers in the Viacom transaction, and Robert Carmel of Williams Real Estate Co. Inc., was the broker in the Equitable lease.

Park Avenue

The law firm of Hartman & Craven has leased about 13,000 square feet of office space at 460 Park Avenue for 15 years at an aggregate rent of approximately \$2 million. The firm is moving from 150 East 58th Street, where it has subleased its space to the Elite Model Management Corporation and Quincy Howe Jr., a photographer.

Richard Rosenthal, vice president of Wm. A. White & Sons, was the broker.

Relocation

The Conrac Corporation, a manufacturer of electronic communications equipment, is relocating from 310 Madison Avenue here to Three Landmark Square in Stamford, Conn.

The company has leased 12,500 square feet of office space for 15 years at an aggregate rent of more than \$3 million.

Edward P. Hobbs, vice president, of Albert B. Ashforth Inc., was the broker.

New Companies

Abrams Benisch Riker Inc. has been formed by Robert H. Abrams, John H. Benisch and Stephen J. Riker, all of whom have been executives with the Cross & Brown Company. The new company, which will offer a full range of commercial and industrial real estate services, is located at 6 East 43d Street.

The Tishman East Management Corporation has been formed to provide owner and tenant services for properties here and in Houston and Atlanta. It will be the East Coast operating arm of the newly formed Tishman Management and Leasing Corporation and will be located at 886 Fifth Avenue. It will manage properties here that were sold by the Tishman Realty & Construction Company to the Equitable Life Assurance Society of the United States as well as the remaining properties held by Tishman Realty & Construction. Charles C. Quinn, formerly senior vice president of Tishman Realty & Construction, has been named president of Tishman East, and Charles L. McQuillan Jr. has been named as executive vice president and Alan C. Vaughan and Anthony L. Citrone first vice presidents.

Sill Realities Inc. has been formed by Louis P. Sill and is located at 535 Fifth Avenue. The company will operate as a sales brokerage company and will also consult and appraise. Mr. Sill formerly headed Herbert Charles & Company in association with Herbert Fischback.



JUNE-JULY 1974

Let There Be Light— but How Much?

by Sandy Marvinney

According to venerable American tradition, young Abraham Lincoln studied his school lessons by the light of a log cabin fireplace. While he undoubtedly acquired a good education, one thing he did not get was eyestrain. The widespread belief that bright lighting is necessary to avoid eyestrain and that reading in low light conditions will harm the eyes is regarded as little more than an unfounded myth by most ophthalmologists.

Coupled with the current energy crisis and the need to reduce our escalating power demands, the high and often glaringly uncomfortable lighting levels found in almost all new office buildings, schools, department stores and supermarkets must be seriously questioned.

Recommended lighting standards are established by the Illuminating Engineering Society (IES), an association with close affiliations to light fixture manufacturers, power companies and organizations such as the Better Light Better Sight Bureau. The periodic IES handbook publishes lighting standards for everything from manufacturing operations to schools, bowling alleys, bakeries and hospitals.

Lighting levels are measured in foot candles, a unit of luminous intensity traditionally based on the light of one candle at a distance of one foot, although a more complex scientific standard is now used. A clear, sunny day at noon would measure a light intensity of about 10,000 foot candles and deep shade about 500 to 600.

The 1972 IES handbook recommends lighting levels of 70 foot candles for school classrooms and 100 foot candles for general office work. This certainly sounds reasonable and actually quite low compared to bright sunlight or deep shade, but are these levels really necessary for visual accuracy and eye comfort?

Lighting standards have risen phenomenally over the past 50 years. In 1943, hardly the dark ages, the IES standard for classroom illumination was only five foot candles. This rose to 30 foot candles in 1952. Fluorescent lighting, which caught hold of the commercial market shortly after World War II, revolutionized lighting practices. A fluorescent tube gives off

three to four times as much light as an incandescent bulb using the same amount of energy and generates considerably less waste heat. It is a much more efficient light source which the lighting industry capitalized on to raise lighting standards.

In the table below lighting standards recommended in a 1951 textbook "Light, Photometry and Illuminating Engineering" by William E. Barrow, professor emeritus of electrical engineering at the University of Maine, are compared to 1972 levels recommended by IES.

	Lighting Standards Comparison (In foot candles)	
	1951 textbook	1972 IES
Bank lobby	20	50
Office buildings		
corridors	5	20
bookkeeping, ac- counting	50	150
deskwork, reading	30	100
prolonged close work (drafting, etc.)	50	200
Restaurants	10	50
School classrooms	30	70
Store merchandise areas	50	100
		200 (self- service)

Dr. Robert Rienecke, Chairman of the Department of Ophthalmology at Albany Medical College states that the 100 foot candle level for offices is "ridiculously high." "I would prefer to see light levels at 7½ to 20 foot candles," Dr. Rienecke said. "We have done visual examinations at 7½ foot candles and the eye functions perfectly."

For reading or similar work Dr. Rienecke advises that light levels be reduced as low as possible while still maintaining visual comfort. "There is no substantive evidence that high light levels help in visual acuity. The eye is an extremely effective organ which can adjust to almost any conditions. It is impossible to lower lighting levels to where they would harm the eyes. Very high levels on the other hand, may actually cause prob-

lems. Excessive exposure to glaring lighting conditions can contribute to eye fatigue, irritation or other discomforts."

The experience of DEC staff members seems to bear this out. To conserve energy, lighting at our Albany headquarters was greatly reduced from the 100 foot candle level that had existed throughout the building. Illumination falling on some desks now measures as low as 35 foot candles. Visual work—reading, typing and so forth—is performed just as easily, accurately, and much more comfortably. Staff members who frequently felt eyestrain, irritation or general vague feelings of fatigue or discomfort by mid-morning under the old 100 foot candle level, now report that these problems have disappeared. Several people who had suffered from slightly "bloodshot" eyes noted that this too cleared up.

Illumination levels in some new office buildings account for 50 to 60 percent of the electric power load and reportedly general lighting in a few new buildings has reached 200 foot candles, far exceeding even IES recommendations. Let's hope our ceilings have reached their outer limits of brightness. In many buildings—old, new and in the planning stages—an illumination de-escalation is already underway.

In New York City's World Trade Center, one eighth of the 274,000 fluorescent tubes were removed in the wake of the energy crisis and lights which once burned 24 hours a day are now shut off after 5:00 p.m. The federal government has removed more than a million tubes from its offices across the country, reducing energy consumption by nine percent. All new government buildings now under construction are designed for "light at the task" requiring movable fixtures that will concentrate light at each desk.

Carl Stein, an architect with the firm of Richard G. Stein, Inc., innovators in designing buildings with energy conservation in mind, has uncovered some interesting statistics in a survey of illumination in New York City schools. Mr. Stein found that lighting levels ranged from only five or six foot candles in the very oldest



buildings to a level of 65 in newer ones. "Interestingly enough," Mr. Stein reports, "there were no complaints from teachers or students about the low classroom lighting in the oldest schools. I am suspicious of lighting standards as they are now formulated. Rather than flooding a whole room with bright light, a background level should be established that is sufficient for most activities and additional light focused where needed. In most classroom situations a 20 foot candle level is entirely adequate."

An examination and re-evaluation of lighting practices in industrial and commercial establishments is also called for. A survey of stores in a large shopping mall near Albany revealed an eye boggling illumination range from a low of only two foot candles in a record shop to an uncomfortably overlit 200 foot candles in a large drug store. For some unfathomed reason, the wall shelves in the drug store had an extra row of fluorescent tubes directed downward to bring the lighting at eye level on the shelves to a soaring 300 foot candles. Perhaps it sells more Visine.

A bakery shop was also decidedly overlit at 110 to 150 foot candles. Two major department stores registered levels of 30 to 60, while small specialty shops ranged everywhere from 10 to 70. Supermarkets are consistently the worst lighting offenders with levels between 100 and 150. The most pleasant shopping conditions and what appears to be perfectly sufficient lighting was found in stores with an illumination of 15 to 30 foot candles.

Obviously there are some circumstances which require high illumination for safety purposes or due to the critical nature of the work performed -- machine shops and hospital operating rooms being two examples. But you do not need 200 foot candles, nor 100 foot candles, nor even 50 to read a label on a can of soup, let alone buy a tube of toothpaste or a bag of jelly doughnuts.

The inherent wastefulness of excessively high illumination, and the greater comfort of lower levels combined with the fuel restrictions imposed by the energy crisis points out the folly of not dimming our lights.

In 1970 approximately 25 percent of the total output of electric utilities was consumed for lighting purposes. This accounts for about \$7 billion in electric bills each year. A 50 percent reduction in lighting levels, which is considered a realistic figure, would save consumers

\$3.5 billion and would also undoubtedly reduce the threat of "brownouts" that have become increasingly common across the country, particularly plaguing major cities such as New York.

A report of the NYS Interdepartmental Fuel and Energy Committee indicates that the electric power to generate lighting is derived from the oil equivalent of 2,038,500 barrels per day. According to the committee's report on Energy Efficiency in Large Buildings: "If the lighting load retains its relative position as a consumer of electrical energy, by 1985, it will require 5,895,000 barrels of oil equivalent daily to satisfy its demand. This is slightly less than 10 percent of the nation's predicted total energy consumption rate of all uses in 1985. The significance of the lighting load in the national energy picture is obvious. The lighting load therefore, should be a prime target for the energy conservation program."

What steps can be taken in this direction? No one advocates a return to gas lamps and firelight, but it is time to say NO to ceilings that are blazing with fluorescent tubes from wall to wall. In most buildings unnecessary lights can be easily removed from the fixtures to immediately lower general illumination.

The Illuminating Engineering Society, although setting lighting standards, has also proposed guidelines for energy conservation through more efficient utilization of lighting. The NYS Interdepartment Fuel and Energy Committee has adopted the following eight IES guidelines in its recommendations for energy conservation in large buildings:

- Design lighting for expected tasks and concentrate it on work areas.
- Design with more effective luminaires to provide proper visibility for the specific task.
- Use efficient light sources.
- Use luminaires designed for heat removal.
- Use light colored finishes on ceilings, walls, floors and furnishings to reflect rather than absorb light.
- Light areas only when required.
- Optimize window design for daylighting and air conditioning.
- Maintain lamps and luminaires in good condition for efficient operation.

The committee report states that adoption of these recommendations could easily result in a one-third reduction of energy used for lighting. It is in the initial design stage that the greatest opportunity for energy conservation exists.

EQ News Briefs

The level of carbon monoxide pollution in Manhattan during December, January and February was 10 to 20 percent lower than during those same months a year earlier, according to Environmental Protection Administrator Robert Low. The measurements were taken at monitoring stations at Canal Street and 59th Street Bridge Plaza. Figures for Sundays were 30 percent lower than a year ago. Mr. Low said the lowered air pollution reflected the 5 to 10 percent reduction in traffic entering the city on weekdays and 25 percent on Sundays compared with a year ago, before the gasoline shortage. The statistics demonstrate dramatically the need to reduce private vehicle traffic if clean air standards are to be met, he said.

Governor Malcolm Wilson has announced that a gift of scenic easements to 980 acres in the Adirondack Park near Blue Mountain Lake has been presented to New York. The scenic easements, given by Eagle Nest Corporation, owned by Gertrude H. Sergievsky, Walter Hochschild and Harold K. Hochschild, "will insure that the land involved is maintained in perpetuity in its present natural state," the Governor said. In this way "these lands will be protected against development, logging, mining, waste disposal, changes in water course and use and other uses inconsistent with the preservation of the natural character and scenic beauty of the lands," Governor Wilson added.

A new Great Lakes salmon hatchery needed to meet production goals for the Department of Environmental Conservation's salmon program has moved a step closer to reality with the awarding of a contract to an engineering firm to finalize site selection and prepare a hatchery master plan. The \$149,400 contract was awarded to Kramer, Chin and Mayo, Inc. of Seattle, Washington, hatchery design specialists. The state and federal governments each supplied \$74,700 of the funds for the contract. Environmental Conservation Commissioner James L. Biggane, who announced signing of the contract, said:

"Our progress in establishing a salmon fishery in the Great Lakes bordering New York has been slowed by the lack of adequate hatchery facilities. This new facility will produce three to four million